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**ORIGINAL RESEARCH**

# Evaluation of Neurotoxicity, Nephorotoxicity and Maternal outcome in eclampsia and preeclampsia patients receiving MgSO4

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**ABSTRACT**

**Background: Developing countries suffer from Pre-eclampsia and eclampsia which are common health problems. MgSO4 is the standard drug for the control and prevention of convulsions in eclampsia. Our study carried out at Bharati Vidyapeeth deemed to be university medical college and hospital, Sangli is based on the Pritchard regimen. This Observational study included 34 eclampsia and pre-eclampsia patients receiving MgSO4 therapy. The loading dose of MgSO4 was 4gm given slowly intravenously over 5-10 min followed by 10gm given intramuscularly (5g in each buttock). Subsequently, 5gm is given intramuscularly into alternate buttocks every 4 hr. Patients were monitored hourly by observing their respiratory rate, knee jerk and urine output. Materials & Methods: An integrative review of the literature was conducted to document the known incidences of severe adverse reactions to magnesium sulphate, and specific outcomes of interest related to its use. The study included the recording of the incidence of any adverse side effect resulting from magnesium sulfate use. Results: A total of 34 pre-eclampsia and eclampsia patients were examined for side effects magnesium sulfate. Out of 34 patients only one patient had oliguria which was cured by delaying the subsequent dose. There was no maternal death that was attributed to the use of magnesium sulfate among the 34 women. Conclusion: This integrative review of magnesium sulfate indicates a low incidence of the most severe side effects documented in the study, which should mitigate safety and toxicity concerns. In general, adverse effects of concern to providers are rare, and when they do occur, delaying the next administration was sufficient to mitigate them. Several measures should be adopted as global guidelines and practices, including early diagnosis and appropriate treatment with proven drugs followed by reasonable vigilance for women under treatment.**

**KEYWORDS: MgSO4, Nephrotoxicity, Neurotoxicity, Eclampsia**

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## AIMS & OBJECTIVES

**Aim: "**To Evaluate Neurotoxicity, Nephrotoxicity and Maternal outcome in pre-eclampsia and eclampsia patients receiving MgSO4".

**Objectives:**

1.To assess the neurotoxicity in pre-eclampsia and eclampsia patients receiving MgSO4
2.To assess the nephrotoxicity in pre-eclampsia and eclampsia patients receiving MgSO4
3.To assess maternal outcome in pre-eclampsia and eclampsia patients receiving MgSO4

## MATERIALS & METHODS

### MATERIAL

Study design: Observational study
Study period: 6 months
Inclusion criteria: Pre-eclampsia and eclampsia patients who were receiving MgSO4 attending our hospital were selected for the study.
Exclusion criteria: Patients with known Neurological disorders were excluded from the study.

### METHODS

A retrospective observational study was conducted for a duration of 6 months in 34 patients with pre-eclampsia and eclampsia receiving MgSO4 who fulfilled the inclusion criteria.
Detailed history regarding raised blood pressure, convulsion, headache, blurring of vision and epigastric pain was taken from every patient. Examination was done including general physical examination (blood pressure, edema, respiratory rate), abdominal examination, respiratory system, central nervous system (DTR) and urine output.
Data obtained was categorized according to the tables. The MgSO4 related complications were noted and maternal outcome was also studied.

## INTRODUCTION

- Pre-eclampsia/eclampsia (PE/E) is a life-threatening multisystem disorder affecting 2 - 8% of all pregnancies worldwide [1,2] that has substantial effect on maternal and newborn health. It is an acute and life-threatening complication of pregnancy associated with elevated maternal and fetal morbidity and mortality.
- Approximately 1 in 2000 deliveries is complicated by eclampsia in developed countries, whereas the incidence in developing countries varies from 1 in 100 to 1 in 1700 cases [3].
- Magnesium sulfate is the drug of choice for prevention of seizures in the pre-eclamptic woman, or prevention of recurrence of seizures in the eclamptic woman, as demonstrated in two large clinical studies. Although the precise mechanism of action is unclear, magnesium sulfate appears to have a peripheral site of action at the neuromuscular junction and does not cross the intact blood brain barrier [4].
- Pritchard showed that magnesium serum concentration required for eclampsia prevention or treatment should be higher than normal serum levels, and suggested that therapeutic concentration should be between 4 and 7 mEq/L[5].
- More serious side effects are rare but include the loss of the patellar reflex (typically occurring at a serum concentration of 8 -10 mEq/L) and respiratory depression (>13 mEq/L) [4,6]. Routine monitoring of a woman undergoing magnesium sulfate therapy includes simple assessment of neurologic status (level of alertness and patellar reflexes), respiratory rate and urinary output [7].
- Oliguria is an element of the disease process [reduced clearance by the kidneys], and not an adverse effect of magnesium sulfate use. Because magnesium is cleared by the kidneys, oliguria of less than 30 cc per hour is used as a determinant for withholding a scheduled dose, in order to prevent toxic levels.

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- If serious toxicity is suspected, and immediate counteraction of magnesium is desired, calcium gluconate can be administered to counteract the effect of magnesium levels that are well above the therapeutic range [6].

## RESULTS

A total of 242 deliveries took place in a period of 6 months, out of which 8.6 % cases were pre
eclampsia patients and 5.37 % cases were eclampsia patients. 34 patients with pre eclampsia and eclampsia who received MgSO4 were studied

**Table 1**

| SUBJECTS | NO OF CASES | PERCENTAGE |
|---|---|---|
| Pre-eclampsia | 21 | 8.6 |
| Eclampsia | 13 | 5.37 |
| Total | 34 | |

The overall rate of absent patellar reflex among all 34 women (including Pre-eclampsia and eclampsia) was 0%, rate of respiratory depression reported was 0% and rate of oliguria reported was 2.9%. Delay in repeat administration of magnesium sulfate occurred in 2.9% of cases.

**Table 2**

| MgSO4 Complications | Pre-eclampsia (no of cases) | Eclampsia (no of cases) | Total (percentage) |
|---|---|---|---|
| Affected patellar reflex | 0 | 0 | 0 |
| Respiratory depression | 0 | 0 | 0 |
| Oliguria | 0 | 1 | 2.9 |

Only one patient was found to have acute renal injury (2.9%). There was no patient who developed cerebrovascular accident and respiratory depression. There was no maternal death attributed to the use of magnesium sulfate.

**Table 3**

| Maternal complication | Pre-eclampsia | Eclapmsia |
|---|---|---|
| Acute renal injury | 0 | 1 |
| Cerebrovascular accident | 0 | 0 |
| Respiratory depression | 0 | 0 |
| Death | 0 | 0 |

## DISCUSSION

Nowadays, magnesium sulphate is the standard form of treatment and prevention for eclampsia. The majority of hospitals follows “Pritchard regimen” which is considered to be safe. It is only free magnesium levels that suppress neuronal electrical activity, not the total MgSo4 levels that is measured by most of the labs. Medical monitoring of the patient remains the mainstay of assessing the severity of MgSo4 toxicity in the patient. Monitoring parameters include Patellar reflex, respiratory rate and urine output. A delayed or absent patellar reflexes is indicative of magnesium toxicity due to curare like action. A blood Magnesium levels of 12 mEq/L or higher results in respiratory paralysis and respiratory arrest. [8] There is treatment with calcium gluconate, 1 gm intravenously, followed by discontinuation of further magnesium doses. Respiratory depression usually respond to this treatment. Smith et al found 0.2% incidence of calcium gluconate administeration. [9] In this study, only one patient was found to have oliguria (acute renal failure) which was corrected

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by delaying the repeat dose of MgSO4. Patient can be saved by prompt diagnosis, intubation and ventilation (if required) , stopping the further administeration of MgSo4 and administrating calcium gluconate.

## CONCLUSION

Concerns about safety and toxicity from the use of magnesium sulfate should be mitigated by findings from this integrative review, which indicates a low incidence of the most severe side effects, documented in study. Adverse effects of concern to providers occur infrequently, and when they occurred, a delay of repeat administration was generally sufficient to mitigate the effect. Early screening and diagnosis of the disease, appropriate treatment with proven drugs, and reasonable vigilance for women under treatment should be adopted as global policy and practice.

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